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**AN EVALUATION OF THE EFFECT OF RESIN
TREATED PAPERBOARD ON THE FLAVOR
OF VARIOUS FOODS**

✓ Project 1108

Progress Report Seven

to

FOURDRINIER KRAFT BOARD INSTITUTE, INC.

July 25, 1955

THE INSTITUTE OF PAPER CHEMISTRY

Appleton, Wisconsin

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APPLETON, WISCONSIN

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ON THE FLAVOR OF VARIOUS FOODS

ABSTRACT

The objective of this investigation was to determine whether the resins Vinsol 423 and Piccopale 70 have an adverse effect on the flavor of various foods which are especially susceptible to taste contamination, namely--bacon, steak, ice cream, and fresh unsalted butter--when they are placed in contact with single-faced corrugated board which has been fabricated from impregnated corrugating medium. Unimpregnated board was included also to serve as a reference. For each type of board--i.e., Vinsol 423 impregnated, Piccopale 70 impregnated, and untreated--each food was wrapped in three different ways: (1) in contact with the kraft liner, (2) in contact with the corrugating medium, and (3) first wrapped in parchment and then placed in contact with the kraft liner. Control samples made of the various foods wrapped in parchment only were also included in each test series.

One series of the butter samples were stored at 68°F. and tasted at the end of 1, 2, and 3 days' storage. A second series was stored at 0°F. and tasted at the end of 7, 21, and 35 days' storage. The taste panel rated the following butter samples stored at 68°F. unpleasant: (1) the sample in contact with Vinsol 423 impregnated corrugating medium, (2) the sample in contact with the liner of the Piccopale 70 impregnated board, and (3) the sample in contact with the Piccopale 70 impregnated corrugating medium. Storage at 68°F. was an

extreme condition; however, in spite of the severity of this storage condition, the butter samples which were first wrapped in parchment before being placed in contact with the board, received ratings on the neutral or pleasant side of the scale. This appears interesting in view of the fact that butter would normally be parchment wrapped. The taste panel rated all butter samples stored at 0°F. as being neutral or pleasant.

The panel rated all the steak samples as being neutral or pleasant to the taste with the exception of the steak which was stored in contact with the Vinsol 423 impregnated corrugating medium. The latter received a rating between neutral and unpleasant.

All of the ice cream and bacon samples were rated as being neutral or pleasant to the taste. None received an unpleasant rating.

The results of this study indicated that, with proper packaging and storage, none of these resins would cause adverse flavor effects on steak, bacon, ice cream, or unsalted butter.

THE INSTITUTE OF PAPER CHEMISTRY

APPLETON, WISCONSIN

INTRODUCTION

The objective of this investigation was to determine whether the resins Vinsol 423 and Piccopale 70 have an adverse effect on the flavor of various foods which are especially susceptible to taste contamination, namely--bacon, steak, ice cream, and unsalted butter. It has become a common practice in the corrugated container industry to impregnate the corrugating medium with a resinous material in order to increase its stiffness and, consequently, its usefulness under conditions of high relative humidity such as would be found in cold storage. Some of these stiffening materials have an odor at room temperature which might in certain environments contaminate a highly susceptible material such as butter. This investigation was undertaken to determine what influence the resins Vinsol 423 and Piccopale 70 have on the products previously named by wrapping these products in direct contact with impregnated paperboard for specified periods of storage and submitting these products after storage to a taste panel of six members for analysis. The procedures followed are described in detail below.

EXPERIMENTAL PROCEDURES

Single-faced corrugated boards were manufactured at the Institute from corrugating medium which had been impregnated with Vinsol 423, in one case, and with Piccopale 70 in another. Forty-two-pound kraft liner was used, and the adhesive was starch. Single-faced board was also manufactured from untreated medium.

For each type of corrugated board--i.e., Vinsol 423 impregnated, Piccopale 70 impregnated, and untreated--each food was wrapped in three different ways: (1) in contact with the kraft liner, (2) in contact with the corrugating medium, and (3) first wrapped in parchment and then placed in contact with the kraft liner. Control samples made of the various foods wrapped in parchment only were included in each test series.

Unsalted butter was cut into squares (1 by 1 by 1/4 in.) and sandwiched between the board (2 by 2 in.) samples. The sandwiches were overwrapped with parchment which was held in place by a small rubber band. Two complete series were set up using fresh unsalted butter as the test medium. One series was stored at 68°F. and tasted after 1, 2, and 3 days' storage. The second series was stored at 0°F. and tasted after 7, 21, and 35 days' storage. The 0°F. temperature and longest storage period is most closely related to actual commercial conditions.

Fresh, uncooked sirloin steak was cut into rectangles (2-1/2 by 2 by 3/4 in.) and sandwiched between board samples (3 by 2-1/2 in.) in the same manner as the butter. All edge fat was removed from the steak samples in order to give greater uniformity throughout the steak series. After storage and before being treated, the steak was fried in unsalted butter without other seasoning. The steak samples were stored at 33°F. and tasted after 2, 5, and 9 days' storage.

The bacon samples (3-1/2 by 1-1/2 by 3/8 in.) were made of two bacon slices cut and stacked to make the sample thick enough to prevent

serious drying during storage. The bacon was fried before being tasted. The storage temperature was 35°F. and the bacon was tasted after 7, 21, and 35 days' storage.

The ice cream samples (2-1/2 by 2 by 1/2 in.) were stored at 0°F. and tasted after 7, 21, and 35 days' storage.

After the indicated periods of storage, the foods were tasted and rated by a panel of six members. The panel was asked to rate the food and note any off tastes which they could identify. The unsalted butter was rated as pleasant, neutral, or unpleasant. The more highly flavored foods--bacon, steak, and ice cream--were rated as very pleasant, pleasant, neutral, unpleasant, or very unpleasant. The samples were coded so that the panel members could not identify the treatments and also the order was randomized for each tasting period. The reference control was, of course, identified to the panel. Later in the test it appeared that a bias existed in rating coded samples lower than the control. In order to test this bias, a second control was coded and inserted in each test series of the following trials. Each test series was divided and tasted, part in the morning and part in the afternoon, to avoid taste fatigue.

DISCUSSION OF RESULTS

It may be recalled that the purpose of this investigation was to determine whether the resins Vinsol 423 and Piccopale 70 have an adverse effect on the flavor of various foods which are especially susceptible to taste contamination, namely--bacon, steak, ice cream, and unsalted butter--when they are placed in contact with single-faced corrugated board which has been fabricated from impregnated corrugating medium; for purposes of comparison, unimpregnated board was also included. For each type of board--i.e., Vinsol 423 impregnated, Piccopale 70 impregnated, and untreated--each food was wrapped in three different ways: (1) in contact with the kraft liner, (2) in contact with the corrugating medium, and (3) first wrapped in parchment and then placed in contact with the kraft liner. Control samples made of the various foods wrapped in parchment only were also included in each test series.

One series of the butter samples were stored at 68°F. and tasted at the end of 1, 2, and 3 days' storage. A second series was stored at 0°F. and tasted at the end of 7, 21, and 35 days' storage. The average results for the six panel members are given in Table I for each test series. It may be seen in Table I that the taste panel rated the following butter samples stored at 68°F. unpleasant: (1) the sample in contact with Vinsol 423 impregnated corrugating medium, (2) the sample in contact with the liner of the Piccopale 70 impregnated board, and (3) the sample in contact with the Piccopale 70 impregnated corrugating medium. Of course, storage at 68°F. would be considered an extreme condition; however, in spite of the severity of this storage

TABLE I
TASTE RESULTS OF RESIN-TREATED PAPERBOARD

Treatment	Contact Side	Average Rating for Entire Test				
		Butter ^a 68°F.	Butter ^a 0°F.	Steak ^b 33°F.	Ice Cream ^b 0°F.	Bacon ^b 33°F.
None	Liner	1.9	1.6	1.4	2.0	1.5
	Corrugated Medium	1.8	1.2	1.6	1.5	1.3
	Parchment + Liner	1.5	1.2	1.3	1.1	1.4
Vinsol 423	Liner	2.0	1.3	1.9	1.3	1.4
	Corrugated Medium	2.6	1.5	2.2	1.3	1.3
	Parchment + Liner	1.4	1.3	1.8	1.2	1.2
Piccopale 70	Liner	2.6	1.3	1.9	1.5	1.2
	Corrugated Medium	3.0	1.3	1.6	1.4	1.4
	Parchment + liner	1.7	1.2	1.5	1.0	1.3
Control		1.0	1.0	1.0	1.0	1.0
Coded Control (Bias)		--	1.1	--	1.3	1.5

^a Butter scale
1.0 = Pleasant
2.0 = Neutral
3.0 = Unpleasant

^b Steak, bacon
and ice cream
scale
1.0 = Very pleasant
1.5 = Pleasant
2.0 = Neutral
2.5 = Unpleasant
3.0 = Very unpleasant

condition, the butter samples which were first wrapped in parchment before being placed in contact with the board, received ratings on the neutral or pleasant side of the scale. This appears interesting in view of the fact that butter would normally be parchment wrapped. With reference to the butter samples stored at 0°F., the panel rated all samples as being neutral or pleasant.

It may be noted in Table I that the panel rated all the steak samples as being neutral or pleasant to the taste with the exception of the steak which was stored in contact with the Vinsol 423 impregnated corrugating medium; the latter received a rating between neutral and unpleasant.

With regard to the samples of bacon and those of ice cream, it may be seen in Table I that all samples were rated as being neutral or pleasant to the taste. None received an unpleasant rating.

Considerable variation was present in the ratings given similar samples by the six panel members. In some instances, this variation covered the entire rating scale. Averages of the results of the six tasters, however, showed good agreement between storage periods. The unsalted butter series at 68°F. was the only test showing a significant decrease in flavor quality at succeeding storage intervals. It appears, therefore, that the storage temperature is the most important factor with respect to resin effects. In commercial practice the wrapping and storage temperatures used for these perishable foods should afford ample protection against any resin odor transfer.

SUMMARY

The effect of Vinsol 423 and Piccopale 70 resin-treated paperboard on the flavor of unsalted butter, bacon, ice cream, and sirloin steak was evaluated. The results indicate that with proper packaging and storage these resins will not cause adverse flavor effects.